

DIGITAL EXPERIENCE ENHANCEMENT USING AN ENSEMBLE DEEP LEARNING MODEL

BACKGROUND

[0001] As computer technology has advanced computers have become increasingly commonplace in our lives. With this increased presence in our lives, developers and designers strive to provide the best digital experience they can for each user. The digital experience for a user refers to the information that the computer provides to the user and the manner in which that information is provided to the user. For example, the digital experience can include making recommendations for content the user may enjoy (e.g., movies, music, books), providing offers or promotions to the user, the manner in which a web site is displayed (e.g., the colors used, the fonts used), and so forth.

[0002] Providing the best digital experience for each user is very beneficial for the users because it provides the users with the digital experience that they want. However, current attempts by designers and developers to provide the best digital experience they can for each user have not been without their problems. One such problem is the accuracy of success in creating such digital experiences is very low, which leads to poor digital experiences for the users. Such poor digital experiences can result in user frustration with their computers and service providers.

SUMMARY

[0003] To mitigate the problem of poor digital experiences being provided to users, the digital experience for a user is enhanced based on past interactions of the user with the digital experience. A request for a recommendation to enhance the digital experience for the user is received, the request including an indication of past user interactions of the user with the digital experience. Multiple estimation values are generated, using an estimator ensemble and based on the indication of past user interactions. At least one of the multiple estimation values is generated by each of a singular value decomposition estimator, a neighborhood or clustering estimator, a factorization estimator, a time-aware estimator, a variational autoencoder estimator, and a gradient boosting estimator included in the estimator ensemble. The recommendation to enhance the digital experience for the user is generated, using a neural network, based on the multiple estimation values. The digital experience is enhanced based on the recommendation, and the enhanced digital experience is displayed.

[0004] In one or more implementations, an ensemble deep learning model is trained to generate recommendations to enhance the digital experience for a user. A first training data set is obtained, the first training data set including, for each of multiple users, values associated with the user for particular items. The estimators in an estimator ensemble are each trained, using the first training data set, to generate an estimation value. The estimators in the estimator ensemble include a singular value decomposition estimator, a neighborhood or clustering estimator, a factorization estimator, a time-aware estimator, a variational autoencoder estimator, and a gradient boosting estimator. A second training data set is obtained that includes, for each of the multiple users, values associated with the user for particular items. Multiple estimation values are generated, using the estimator

ensemble, based on the second training data set. A neural network is trained, using the multiple estimation values, to generate a recommendation to enhance the digital experience for the user. The digital experience is enhanced using the recommendation.

[0005] This Summary introduces a selection of concepts in a simplified form that are further described below in the Detailed Description. As such, this Summary is not intended to identify essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The detailed description is described with reference to the accompanying figures. Entities represented in the figures may be indicative of one or more entities and thus reference may be made interchangeably to single or plural forms of the entities in the discussion.

[0007] FIG. 1 is an illustration of a digital medium environment in an example implementation that is operable to employ the digital experience enhancement using an ensemble deep learning model techniques described herein.

[0008] FIG. 2 is an illustration of an example architecture of a digital experience enhancement system.

[0009] FIG. 3 illustrates an example of training the ensemble deep learning model.

[0010] FIG. 4 illustrates an example of a neural network.

[0011] FIG. 5 illustrates another example of a neural network.

[0012] FIG. 6 is a flow diagram depicting a procedure in an example implementation of digital experience enhancement using an ensemble deep learning model.

[0013] FIG. 7 is a flow diagram depicting a procedure in an example implementation of digital experience enhancement using an ensemble deep learning model.

[0014] FIG. 8 illustrates an example system including various components of an example device that can be implemented as any type of computing device as described and/or utilized with reference to FIGS. 1-7 to implement aspects of the techniques described herein.

DETAILED DESCRIPTION

[0015] Overview

[0016] Digital experience enhancement using an ensemble deep learning model is discussed herein. Generally, a digital experience generation system creates content for display, providing a digital experience to the user. The digital experience generation system leverages an ensemble deep learning model that generates recommendations to enhance the digital experience. These enhancements can take various forms, such as recommendations of movies to watch or books to read, recommendations regarding whether to present offers or advertisements to a user, recommendations for web page display settings (e.g., fonts or colors), and so forth. The ensemble deep learning model is trained to generate recommendations to enhance digital experiences, and the digital experience generation system uses the recommendations to enhance digital experiences.

[0017] More specifically, the digital experience enhancement system includes an ensemble deep learning model that is trained to generate a digital experience enhancement recommendation from an enhancement request. The ensemble deep learning model includes an estimator